

ART. III.—*The Specific Name of the Australian Aturia
and its Distribution.*

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(With Text Figure.)

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The Specific Name.

The unrivalled experience and wide acquaintance of the Tertiary mollusca which my friend, Mr. R. Bullen Newton, possesses would naturally forbid me to question his decision that the Australian *Aturia australis* is identical with the European *Aturia aturi*, had it not happened that already I have shown,¹ at least to my own satisfaction, that the species are entirely distinct.

Mr. Newton has recently published² an account of a sandstone cast of an *Aturia* from Western Australia, lately acquired by the British Museum, and bases upon this and a comparison of presumably the two specimens recorded from the British Museum collection,³ a conclusion as to their identity. The differences between these forms, the Australian and the European, I have already pointed out,⁴ though this seems to have been overlooked by Mr. Newton. These differences are as follows:—

- “ (1) The Australian shells are more compressed.
- (2) The septa and growth-lines are more strongly recurved towards the periphery.
- (3) The siphuncular orifice is larger.”⁵

In the same paper I also remarked as follows:—

“ In view of the above-named characters, which are constant so far as my own observations go, there are justifiable grounds for keeping the Australian form as a distinct species, at the same time bearing in mind that its relationship is nearest *Aturia aturi*. . . . Probably did the London Museum [British]

1. Proc. R. Soc. Vict., Vol. xxvii. (N.S.), pt. ii., 1915, pp. 350-353, pl. iii., figs. 1, 2.

2. Proc. Malac. Soc., Vol. xiii., Oct., 1919, pp. 160-167, pl. v.

3. Cat. Foss. Cephalopoda, Brit. Mus., pt. ii., 1891, p. 355.

4. Loc. supra cit., p. 352.

5. I find, however, that this is not an invariable character.

possess a larger comparative series of the Australian form, that view⁶ might undergo some modification, and it is to be regretted that Mr. Newton did not have time to critically examine the series of *Aturia* in the Melbourne National Museum."

From a re-examination of the Australian examples I am satisfied that the forms are perfectly distinct, the compressed sides and the generally narrower shell being marked characters of Balcombian, Janjukian and Kalimnan specimens. This feature of the compressed shell is very characteristic of all the southern specimens so far as I have seen, and in some specimens it is developed to an extreme degree. On the other hand the European *A. aturi* tends towards obesity, and an extreme example of this is figured by Bronn.⁷

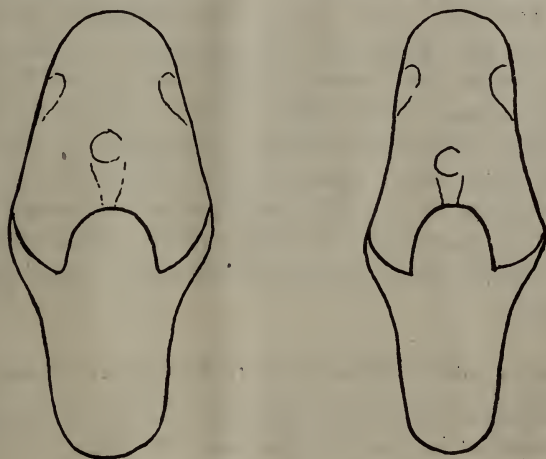
Hypothesis of Type Origin.

From the preceding note of the variations seen in the southern and northern forms it is highly probable that the early (? Lower Oligocene or even Eocene⁸) shells which were ancestral to

ORAL ASPECT OF NORTHERN AND SOUTHERN TYPES.

Aturia aturi, Basterot

Aturia australis, McCoy.



6. Newton and Cricks' agreement as to the identity of the two forms.

7. *Lethaea Geognostica*, Vol. iii., and pl. xlii., figs. 17a-c.

8. This earlier stage is suggested on account of the occurrence of large and well-developed shells in the Balcombian of Muddy Creek, one example, found by my son, W. D. Chapman, and now in the National Museum, having a diameter of nearly seven inches.

the already discovered fossils were intermediate in character, and originated in moderately low latitudes, in the Indian Ocean geosynclinal area. The southern form probably radiating to Patagonia, Australia and New Zealand, exhibits variants of compression, whilst that found in Europe tends to inflation. Further data bearing on this hypothesis are furnished in regard to the ratio of shell measurement—umbilical width to diameter. For example, one of the oldest Australian specimens gave a ratio of 1 : 2.91, as against the Bordeaux specimen, 1.2.2; whilst a younger (Janjukian) specimen from Torquay, Victoria gave 1 : 3.26. The Kalimnan specimens are too fragmentary to measure, but bear out this gradually decreasing width ratio.

Distribution of *ATURIA AUSTRALIS*.

Mr. Newton has already given copious notes of the distribution of this fossil in the paper referred to, and it will therefore be unnecessary to repeat them *in extenso*. In New Zealand, we may remark in passing, that *Aturia australis*, though common in the Lower Oamaruan, dies out before the upper beds (Awamoan) are reached. Its geological range in that area seems indeed to be restricted, as was that of *Aturia aturi* in France, Egypt, and elsewhere. Mr. Newton has suggested that the Southern Australian Tertiaries (Balcombian, Janjukian and Kalimnan) represent the Lower, Middle and Upper Miocene, having regard, amongst other data, to the co-extensive range of *Aturia* therein. There are perhaps some points in favour of linking up the lower beds, seeing that at Muddy Creek (Balcombian), both large and small *Lepidocyclinae* are found associated together, as they also are at Batesford (Janjukian), but the evidence requires more support to warrant a re-adjustment of the time-scale.

Comparisons and Limitations of European Stages.

On the evidence derived from a study of the larger Foraminifera, the Balcombian is clearly Aquitanian, so nearly as we can arrive at a correlation of distant sediments. This stage was included by Meyer-Eymar⁹ in the Upper Oligocene. Since then Dollfus has favoured the inclusion of the Aquitanian in the

9. Classification des Terrains tertiaires, 1884.

{	Aquitanien	Upper	}	Oligocene.
	Tongrien	Middle		
	Ligurien	Lower		

Miocene.¹⁰ The American geologists, Osborne¹¹ and Chamberlin, as well as Deperet,¹² advocate the position of the Aquitanian as Upper Oligocene. Mainly from the occurrence of the Foraminifera, H. Douville and F. Sacco have in their numerous papers before the Geological Society of France, regarded the large discoidal *Lepidocyclinae* as of Aquitanian age, and the smaller forms of Burdigalian. The genus itself they limit to the Miocene, and therefore they regard Aquitanian as Lower Miocene. Haug, in his studies of geosynclinals also supports these views, regarding the northern Miocene period as one diastrophic whole. We may still hold to the view, however, that great crustal movements did not commence synchronously at the Antipodes.

The sequence of the Lower Tertiary beds in Southern Australia is very gradual, and the sedimentation in one area at least, as shown by the cores from the Sorrento Bore, was never interrupted in that area, but was continuously marine. On the other hand there is a marked unconformity between the Janjukian and Kalimnan, which plainly demonstrates a considerable time-break, and denoted usually by a nodule bed, and we are perforced to mark its distinction from the Miocene as a whole, although, as in *Aturia*, some species range through to the basement Kalimnan.

Referring to the suggestion that the Kalimnan series of Victoria represents the Upper Miocene (Messinian or Pontian)¹³ of Europe, by an argument based on the occurrence of *Scaldicetus*, this idea is almost nullified by the fact that this cetacean genus has been lately discovered anew¹⁴ in the Balcombian beds of Muddy Creek (*Scaldicetus lodgei*). Further than this, the presence of the Miocene sharks' teeth in the Kalimnan is accounted for by their occurrence in the basal bed which is often remanié in character.

Summary of Argument.

The writer finds no evidence to justify the identification of *Aturia aturi*, Basterot, with *Aturia australis*, McCoy, and from

10. See "L'Aquitani en Aquitania," Bull. Soc. Geol. France, ser. 4, vol. xii., 1912, p. 472.

11. The Age of Mammals, 1919, p. 224.

12. Transformations of the Animal World. Inter. Sci. Ser., 1909, Table.

13. Newton, Loc. cit., p. 166.

14. Proc. Roy. Soc. Vict., Vol. xxx. (N.S.), pt. i., 1917, p. 34, pl. iv., fig. 6.

a renewed examination concludes that they have distinctive characters of their own which must be regarded as specific.

The suggestion that the Balcombian to Kalimnan Tertiary beds of Southern Australia comprise one period, the Miocene, seems to be untenable from the fact that the succession above the Kalimnan passes upward in sequence, and a new arrangement would mean either an unconformity or the intercalation of a new horizon between the Kalimnan and the Werrikooian to include a Lower Pliocene horizon, which speaking faunistically, is not possible.